

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

---

Name of the Factory	: <b>Anzir Apparels Limited, Unit-1</b>
Address of the Factory	: Karim supermarket, Baipal, Baipal, Savar, Dhaka, Bangladesh.
Present Status of the Factory	: <b>Under Operation</b>
Structural Assessment conducted by	: Alliance
Date of Structural Inspection	: 30 Apr 2014
Fire & Electrical Assessment conducted by	: Alliance
Date of Fire & Electrical Inspection	: 30 Apr 2014 & 02 Jul 2014.

### **BASIC INFORMATION:**

The Present Garment Factory is comprises of a 2 Main Buildings & 2 Ancillary Buildings. The following general information was noted:

- i. Building Usage Type : Garments Factory.
- ii. Structural System : Building - 1: RCC moment resisting frame structure.  
Building - 2: Moment Rising Steel Gable Frame Structure.
- iii. Floor System : Beam Slab type in RCC Building & others slab on ground.
- iv. Floor Area : 67,500 Sft.
- v. No. of Stories : 5 Storied + one basement & others are Single Story.
- vi. Construction Year : B-1:1997-2000,B-2:2012
- vii. Foundation Type : Unknown
- viii. Design Drawings : Not Available.
- ix. Soil investigation Report : Available
- x. Construction Materials : RCC (Brick Chips).
- xi. Generator : Ground Floor.

### **RECOMMENDATIONS FOR CORRECTIVE ACTION:**

The recommendations of corrective action for Structural, Fire and Electrical Safety comprises of Short Term, Mid Term and Long Term basis are as follows:

#### **The Recommendations for Structural Safety Corrective Actions are:**

Immediate : N/A.

Short Term (3 Weeks) :

- i. Develop a program to ensure that all live loads for which a floor or roof has been designed for will not be exceeded. The designated Load Manager shall oversee this program and ensure it is enforced.
- ii. Designate a representative as the Factory Load Manager. The Factory Owner shall ensure that at least one individual, the Factory Load Manager who is located onsite full time at the factory, is trained in calculating operational load characteristics of the specific factory. The Factory Load Manager shall serve as an ongoing resource to RMG vendors and be responsible to ensure that the factory operational loads do not at any time exceed the factory floor load limits as described on the Floor Load Plans.

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

---

Mid Term (6 Weeks)

:

- i. Have a qualified structural engineer provide further analysis and investigation of the structural deficiencies. Structural engineer shall also provide remediation documents if required.
- ii. Adequately anchor and brace all non-structural elements to resist earthquake forces to comply with the BNBC and Alliance Standard.
- iii. Complete Action Items from previous assessment.
- iv. Have a qualified structural engineer prepare credible as-built documents based on the requirements of Part 8 Section 8.19 of the Alliance Standard.
- v. Engage a qualified structural engineer to develop the required documents to confirm the structural integrity of the buildings. Documents must comply with Alliance Standard Part 8 Section 8.19 and 8.20
- vi. Have a qualified structural engineer confirm that capacity to support the load is available. Load plans complying with Alliance Standard Part 8 Section 8.40.4.3 should also be developed.
- vii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading for Building 2
- viii. Engage a qualified structural engineer to confirm satisfactory structural performance of the buildings under wind loading.
- ix. Have a qualified structural engineer assess the durability aspects as suggested in Alliance Standard Part 7 Section 7.2 and take appropriate remedial measures.
- x. Have a qualified structural engineer develop Floor Loading Plans per the requirements of Part 8 Section 8.20.5.3
- xi. Have a qualified structural engineer prepare load plans including the information required in Section 8.20 of the Alliance Standard.
- xii. Have a qualified structural engineer to prepare load plans including in section 8.20 of the Alliance standard and provide signage or the appropriate markings at all areas used for storage to indicate the acceptable loading limits detailed in the Load Plan.

Long Term (6 months)

:

- i. Apply for issuance of Certificate of Occupancy and pursue the matter.
- ii. Under guidance from a qualified structural engineer, address all areas of needed maintenance by correcting the identified issues.
- iii. Provide a protective coating at the structural elements constructed with MCAC exposed to rainfall or other sources of water. Have protective coating approved by the Alliance or a qualified structural engineer. Or provide 2% slope on the exposed surfaces to prevent the accumulation of water.
- iv. Repair the exterior façade system to prevent water intrusion.

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

### The recommendations for Electrical Safety corrective actions are:

Immediate	Remove all improperly stored materials (water drum, table etc.) from the generator room. Ensure that the generator is cleaned regularly.
Short Term (3 Weeks)	<p>Relocate the distribution board to a safe location where it is not in risk of ingress of water.</p> <p>Provide shielding or additional insulation for wiring exposed to external heat sources or follow another route, one that is away from the external heat source. For laying of cable, use industrial graded flexible pipes/rigid pipes with proper support.</p> <p>All boxes and enclosures (including transfer switches, generators, and power panels) for emergency circuits shall be permanently marked so they will be readily identified as a component of an emergency circuit or system. The required marking can be done by color code, the words “emergency system,” or any other method that identifies the box or enclosure as a component of the emergency system.</p> <p>Provide protective covers on light fixtures inside all areas that are being used for storage.</p> <p>Provide 1 m (39 in) clearance in front of all distribution boards so that there is adequate space for routine inspection and maintenance work. Relocate the panels if necessary.</p>
Mid Term (6 Weeks)	<p>Have a qualified electrical engineer develop as-built electrical drawings detailing key components of the electrical system.</p> <p>Check all the cables and circuit breakers and sort out the higher rated circuit breakers. The rated current of a protective device (MCB, MCCB or fuse) must not exceed the current carrying capacity of any conductor. For the noted location, install an appropriate sized MCCB (200A preferably) inside a metallic enclosure of minimum 20 SWG thickness instead of installing on wooden board.</p> <p>Provide cable tray with cover for mechanical support and protection of the generator outgoing cables.</p> <p>Develop and implement an electrical safety program. Include key topics such as lock out tag out procedures, personal protective equipment requirements, etc.</p>
Long Term (6 Months)	<p>Complete Thermographic scans at least on a three year cycle. Thermographic scans should be completed in accordance with the Standard for Infrared Inspection of Electrical Systems &amp; Rotating Equipment and NFPA70B or a comparable standard.</p> <p>Have a qualified electrical engineer design a lightning protection system and a licensed electrician install the designed system.</p>

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

### The recommendations for Fire Safety corrective actions are:

<p>Immediate (3 to 6 Days)</p>	<p>Remove all impediments, obstructions, and stored materials from the means of egress. Keep all elements of the means of egress (exit path, aisles, stairs, corridors, etc.) continuously free and clear of all obstructions in accordance with Alliance Standard Section 6.3.9.</p> <p>Remove all stored materials in the stairwells from noted locations.</p>
<p>Short Term (3 Weeks)</p>	<p>Remove all locking devices from all egress doors and means of egress components in accordance with Alliance Standard Section 6.8. If locks are required for security reasons, utilize special door locking features complying with NFPA 101.</p>
<p>Mid Term (6 Weeks)</p>	<p>Apply to appropriate authority in an expeditious manner for issuance of all applicable permits and licenses for each building and ancillary structure.</p> <p>Apply to appropriate authority in an expeditious manner for issuance of the Certificates of Occupancy for each building and ancillary structure according to building use.</p> <p>Complete fire department pre-planning activities with the local Fire Service and Civil Defense.</p> <p>Conduct fire drills on a quarterly basis as outlined in BNBC Part 4 Appendix A for all garment facilities. Fire drills shall be conducted under the direction of a Fire Safety Director. All other requirements for fire drills shall be conducted in accordance with BNBC Part 4 Appendix A.</p> <p>Develop a testing and maintenance program that ensures the emergency power for exit signs is tested at least once per year. If battery operated signs are used, these lights are tested on a monthly basis. Functional testing of battery powered signs is provided for a minimum 90 min once per year.</p> <p>Develop an emergency evacuation plan which includes all components required by the Alliance Standards and communicate the plan to all employees.</p> <p>Implement training programs and document in accordance with the Alliance Safety Training Curriculum.</p> <p>Install a new automatic fire alarm and detection system. Once installed, arrange for direct connection of the fire alarm and detection system to a central station monitoring service or the Fire Service and Civil Defense as per Alliance Standard Section 5.7.5. Until that time, a person trained to contact the Fire Service and Civil Defense in the event of fire alarm activation shall be provided. An annunciator shall be located in a constantly attended location (such as a fire control room) to alert this person.</p> <p>Install an automatic fire alarm and detection system for the facility. System shall comply with the Alliance Standard and NFPA 72. Consult a qualified fire protection engineer and/or authorized fire alarm company to design and install</p>

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>the system.</p> <p>Install required signage for the standpipe system identification at the noted locations. Signage needs to comply with NFPA 14 Chapter 6.</p> <p>Install signage adjacent to each stair door indicating the stair name and the floor level in both English and Bengali.</p> <p>Post emergency egress maps at the entrance to each exit stair or main point of egress.</p> <p>Post the occupant loads for every assembly and production floor in a facility in a conspicuous space near the main exit or exit access doorway for the space.</p>
<p>Long Term (6 Months)</p>	<p>Create a Fire Safety Director position and fill the position with an individual that has had sufficient training to be able to carry the required duties.</p> <p>Develop a hot work permit program. The program must comply with the requirements of NFPA 51B.</p> <p>Enclose all the exposures (openings) in the exterior wall of stair-1 with 2-hour rated construction. The rated assembly should be design by a qualified fire protection engineer.</p> <p>Establish an inspection, testing and maintenance program for all fire extinguishers. Program must comply with the requirements of NFPA 10.</p> <p>Establish an inspection, testing, and maintenance program for the standpipe system. Program must comply with NFPA 25. Any newly installed standpipe system needs to be evaluated for compliance with the design pressure and flow demands of NFPA 14 or BNBC Section 5.4.3.</p> <p>Establish written corporate and plant policies on housekeeping to ensure scheduled cleaning for floor, wall, ceiling, supply and return air ventilation systems. Promptly reschedule skipped cleanings. Provide a documented line of authority for authorizing a cleaning delay and rescheduling.</p> <p>Install a dedicated fire pump for the facility in accordance with NFPA 20 to supply the demands of the connected fire protection systems along with a stored source of water sufficient to meet the demands in accordance with NFPA 22. Fire pump installation is to be tested for final acceptance in presence of Alliance and a final inspection of the installation shall be conducted by the Alliance prior to final acceptance of the installation by the Alliance as per clause 5.5.5. Acceptance testing of the installation shall be in accordance with NFPA 20, 22, and 25 testing requirements. Documentation of all testing shall be submitted to the Alliance for review prior to final acceptance by the Alliance. The pump is to be connected to an alternative power source such as a generator. The generator is to be configured with an ATS (auto starter).</p> <p>Install emergency lighting for all paths of egress in accordance with Alliance Standard Section 6.7. Illumination needs to be a minimum of 10 lux for all corridors, exit</p>

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>doors and stairways. Illumination for aisles needs to be a minimum of 2.5 lux. Egress lighting shall be provided with emergency power or supplemented with battery powered lights that provide a minimum of 10 lux for not less than 30 mins in the event of failure of normal lighting.</p> <p>Install fire extinguishers at locations and heights in accordance with BNBC Part 4 and NFPA 10.</p> <p>Install handrails on the both sides of the stairs. A minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.) as measured from the leading edge of the tread needs to be maintained when installing new handrails. The spacing between vertical members will not exceed 200 mm (8 inch). Install intermediate handrails on stair-2 since stair width exceeds 2.2 m (87 in.).</p> <p>Install initiating devices and notification appliances as required by the Alliance Standard and NFPA 72. This includes electrical supervision of all valves controlling fire protection systems (sprinklers, fire pumps, water supplies, etc.). Connect devices to an automatic fire alarm and detection system for the facility. All fire alarm installations shall be submitted for review by the Alliance prior to commencement of installation.</p> <p>Install standpipe system at required locations. Standpipe system must comply with NFPA 14. The hydraulic calculations should be submitted and reviewed by Alliance prior to start of work. All standpipe system installation activities shall be submitted for reviewed by the Alliance prior to commencement of installation in accordance with Section 5.4.3.2.</p> <p>Occupied roofs shall be provided with the minimum number of exits (stairs) required as a story.</p> <p>Provide a minimum ceiling height in the means of egress of 2.3 m (7 ft 6 in) with projections from the ceiling not less than 2.03 m (6 ft 8 in) in accordance with Alliance Standard Section 6.3.3.</p> <p>Provide a uniform slope/ramp for the walking surface. Slope should not exceed 1 in 20 in the direction of travel. Any changes in elevation (protrusions or lips) must not exceed 1/4 in.</p> <p>Provide continuously illuminated exit signs at all required exits and along egress paths, especially where path has a change of direction. Exit signs may be illuminated either by lamps exterior to the sign or contained within the sign. The source of illumination shall provide not less than 50 lux at the illuminated surface with a contrast of not less than 0.5. Approved self-luminous signs which provide evenly illuminated letters having a minimum luminance of 0.2 cd/m<sup>2</sup> may also be used.</p> <p>Provide continuously illuminated exit signs per Alliance Standard Section 6.11. Signs shall be placed at all required exits and along egress paths, especially where there is a change in direction for the path of travel.</p>
--	---

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

	<p>Provide Fire Department (Siamese) connections in accordance with Alliance Standard Section 5.5.4. Connections shall match the Fire Service and Civil Defense hose thread standard.</p> <p>Provide fire-resistive rated assemblies for exit access corridors in accordance with Alliance Standard Section 6.3.1.1 or provide an automatic sprinkler system throughout the story or building per NFPA 13. Consult a qualified fire protection engineer to design the required rated assembly or sprinkler system.</p> <p>Provide fire-resistive rated construction barriers and associated opening protection for exit enclosures in accordance with Alliance Standard Sections 4.5 and 4.6. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Provide fire-resistive rated construction barriers between hazard types in accordance with Alliance Standard Sections 3.4 and 4.5. Consult a qualified fire protection engineer to design the required rated construction barrier.</p> <p>Provide fire-resistive rated opening and penetration protection for rated walls and assemblies in accordance with Alliance Standard Sections 4.6 and 4.7. Consult a qualified fire protection engineer to design the required opening protectives and penetration systems.</p> <p>Provide parapet in every occupied roofs with same fire rating of outer wall of the building and a minimum height of 1067 mm (42 in.).</p> <p>Provide required number of aisles with a minimum unobstructed clear width of 0.9 m (36 in) with proper marking on all floors.</p> <p>Provide training and certification for the required number of people in fire fighting, first aid, and rescue training by an appropriate authority in accordance with the Alliance Safety Training Curriculum.</p> <p>Re-construct the ramp with a maximum running slope no greater than 1 in 8 (12.5 percent) or provided steps following Alliance Standard Section 6.9. Also, handrail shall be provided on both sides of the ramp with a minimum height of 865 mm (34 in.) and a maximum height of 965 mm (38 in.).</p> <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Replace non-compliant doors and frames in the means of egress with side-swinging doors. Replacement doors shall be a minimum width of 0.8 m (32 in), and are listed, approved, self-closing, fire rated door assemblies (door and frame) with latching panic hardware.</p> <p>Route exits directly to the exterior or provide an exit</p>
--	---

## Summary of Preliminary Assessment on Structural, Fire and Electrical Safety

---

	<p>passageway in accordance with Alliance Standard Section 6.15 or an Egress Court in accordance with Alliance Standard Section 6.17.2 for non-compliant arrangements. Consult a qualified fire protection engineer to design and/or approve the required exit passageway or egress court.</p> <p>Terminate both stair-2 and the ramp discharge directly outside the building or construct a rated exit passageway which leads directly outside the building. Consult a qualified fire protection engineer to assist with the design for these requirements.</p> <p>The factory needs to ensure that building management and factory management are on the same page with regards to fire safety and the fire protection systems in order to protect the entire building per the Alliance Standard.</p>
--	---